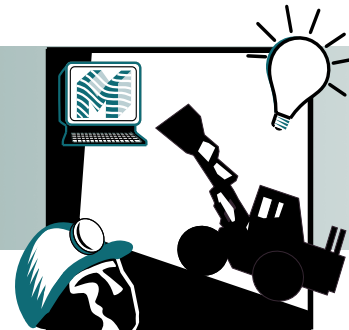


MINING

Project Fact Sheet



HIGH TEMPERATURE SUPERCONDUCTORS IN UNDERGROUND COMMUNICATIONS

BENEFITS

- Increases miner productivity
- Increases underground mine safety
- Increases productivity of autonomous mining equipment

APPLICATION

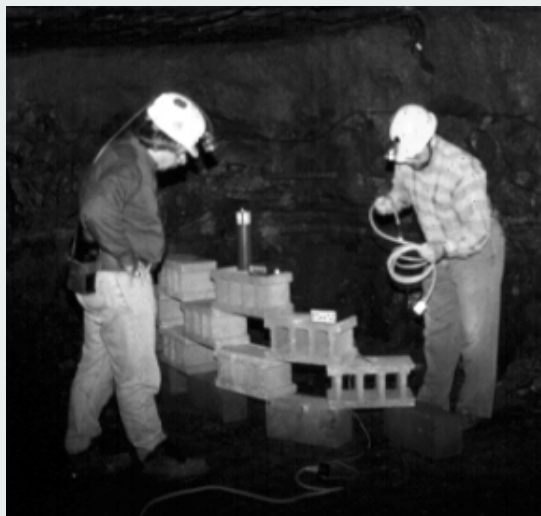
This new technology can be used in any underground mining operation and can benefit the individual miner or mining equipment.

ENHANCED UNDERGROUND COMMUNICATIONS WILL INCREASE PRODUCTIVITY AND SAFETY

The use of superconducting materials in communication equipment will increase the range of through-the-earth communications and make underground wireless networks commonplace in underground mining operations. The high temperature Superconducting Quantum Interference Devices (SQUID) system can increase underground mining production by allowing better communications and orientation and position information which can benefit both an individual miner or a mining machine. This system also improves underground mining safety through wireless communications.

The best approach to underground communications systems is to use low frequency electromagnetic waves that can deeply penetrate into the earth. The existing low frequency receivers are relatively insensitive to low frequency magnetic fields when configured into small packages and used over a wide bandwidth. Receivers based on high temperature SQUID technology are far more sensitive to low frequency magnetic fields, and can be placed in small packages easily carried by miners moving in an underground environment. The SQUID receivers possess the sensitivity and bandwidth to carry voice and data in a configuration that is easier to install and maintain than hard-wired technology.

COMMUNICATIONS TESTING



Workers test a communications receiver in an underground mine.



Project Description

Objective: To develop and apply high temperature superconductors in underground communications to improve safety, productivity, and energy efficiency.

Progress and Milestones

This project includes the following activities:

- Conduct field tests to examine noise backgrounds and signal propagation
- Develop long range audio
- Evaluate industry needs for portable communications
- Identify MSHA requirements effect on in-mine systems
- Demonstrate high quality long range audio to mining companies
- Perform system analysis of underground radio networks and potential benefits
- Design and build portable transmitters
- Field demonstrate two-way radio based on portable electronics
- Transfer communications technology to mining partners



PROJECT PARTNERS

Los Alamos National Laboratory
Los Alamos, NM

Helca Mining Company
Coeur d'Alene, ID

CONSOL Inc.
Libary, PA

Cyprus Amax Minerals Company
Englewood, CO

ASARCO Incorporated
Sahuarita, AZ

Phelps Dodge Mining Company
Morenci, AZ

Raton Technology Research
Raton, NM

Harris Communications
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